

Utah Science

Volume 54 | Number 3

Article 1

Fall 1993

Utah Science Vol. 54 No. 3, Fall 1993

Follow this and additional works at: <https://digitalcommons.usu.edu/utscience>

Utah Science is produced by Utah State University Agricultural Experiment Station.

Recommended Citation

(1993) "Utah Science Vol. 54 No. 3, Fall 1993," *Utah Science*: Vol. 54 : No. 3 , Article 1.

Available at: <https://digitalcommons.usu.edu/utscience/vol54/iss3/1>

This Article is brought to you for free and open access by the Journals at DigitalCommons@USU. It has been accepted for inclusion in Utah Science by an authorized administrator of DigitalCommons@USU. For more information, please contact digitalcommons@usu.edu.



UTAH SCIENCE

UTAH STATE UNIVERSITY

AGRICULTURAL EXPERIMENT STATION

VOLUME 54 FALL 1993 NUMBER 3



UTAH SCIENCE

UTAH AGRICULTURAL EXPERIMENT STATION
UTAH STATE UNIVERSITY
LOGAN, UTAH 84322-4845

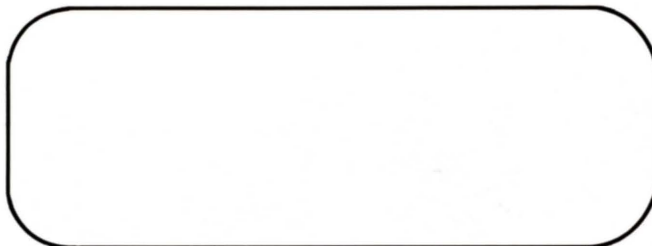
Paul Rasmussen

DIRECTOR

Address Correction Requested



UTAH STATE UNIVERSITY



UTAH SCIENCE

UTAH STATE UNIVERSITY AGRICULTURAL EXPERIMENT STATION VOLUME 54 FALL 1993 NUMBER 3

An issue devoted to 1993 Land Grant Days The Role of the Land Grant University in the Management of Public Lands



- 66 USU Aids Search for "Common Ground"
- 67 New Roles for a Contemporary Land Grant University
- 71 Fees on Public Lands: Not all Users Pay A Fair Share
- 75 In the Short Term, Grim Prospects for Extractive Industries in Utah
- 79 Public Lands Often Not the Key to Rural Economic Development
- 83 Research in Brief
- 87 Recipient of 1993 Land Grant Hall of Fame Award
- 88 Panelists Endorse Objectivity as USU Goal
- 93 Wilderness Designation: Economic Effects Often Depend on Legal Definitions
- 98 Cattle Displaced from Rangeland May Find a Home on Irrigated Pastures

UTAH SCIENCE is a quarterly magazine devoted primarily to Experiment Station research in agriculture and related areas. Published by the Utah Agricultural Experiment Station, Utah State University, Logan, Utah 84322-4845.

This magazine will be sent free on request in the United States, and to libraries and other public institutions elsewhere. Single issues are free upon request. Subscriptions mailed to individuals in other countries cost \$10.00 annually. Please include a mailing label from a recent issue of UTAH SCIENCE with any request for change of address.

To avoid overuse of technical terms, sometimes trade names of products or equipment are used. No endorsement of specific products or firms named is intended, nor is criticism implied of those not mentioned.

Articles and information appearing in UTAH SCIENCE become public property upon publication. They may be reprinted provided that no endorsement of a specific commercial product or firm is stated or implied in so doing. Please credit the authors, Utah State University, and UTAH SCIENCE.

George H. Emert
PRESIDENT, UTAH STATE UNIVERSITY
Rodney J. Brown
DEAN OF AGRICULTURE
H. Paul Rasmussen
DIRECTOR, AGRICULTURAL EXPERIMENT
STATION

Kurt W. Gutknecht
EDITOR
Holly Broome-Hyer
GRAPHIC ARTIST
Gary Neuenswander
MEDIA SPECIALIST
Lynette Harris
RESEARCH WRITER, INFORMATION SERVICES

Utah State University is committed to a policy of equal opportunity in student admission, student financial assistance, and faculty and staff employment and advancement, without regard to race, color, religion, sex, age, national origin, or handicap.

USU Aids Search for "COMMON GROUND"

USU President George Emert said that a land grant university should be "an important part of the wrangling over grazing fees, wilderness designation, water rights, and other natural resource management issues.

"We've been criticized, for not helping rural communities, many of which are surrounded by public lands," he said. "Some of this criticism is misplaced, but there is always an opportunity to do better. The issues facing us are far more complex than when this university was called the Utah Agricultural College.

"The goal is not to walk away in agreement on every detail about how we should manage our public lands, if you think they should be managed at all. We're not that naive. Researchers on our own campus do not agree with each other on many of the public lands issues and policies. We have lively debate.



"The measure of success for such a forum is the degree to which we can arrive at a point where we respect each other's rights, each other's opinions, and especially each other's right to disagree. If we do that, we will avoid pitfalls of passion, politics and rhetoric and instead reflect facts, findings, and, hopefully, just plain good science."

"I believe we can find common ground. The common ground among us is that we are all vitally interested in the future of our public lands even though we don't have the same agendas."

New Roles for a Contemporary LAND GRANT UNIVERSITY

Wither land grant universities? Not if they are impartial and not if they don't shirk contentious policy issues, such as those surrounding the use of public lands.

It's important that land grant universities not be viewed as advocates for particular groups, said Emery Castle, an economist and policy analyst from Oregon State University who spoke during Land Grant Days on "Public Policy, Credibility and Land Grant Universities."

"Land grant universities need to establish credibility—their public policy work should be found to be equally reliable by all who are affected by it, regardless of where they fit on the policy spectrum," he said.



Land grant universities have often confused a mandate to do work related to agriculture as a license to be a policy advocate for agriculture.

Several land grant universities have shown that “they are not interested in just making marginal changes from the status quo,” Castle said, although some traditional supporters of land grant universities may not welcome the transition.

Administrators and faculty at land grant universities “have often confused a mandate to do work related to agriculture as license to be a policy advocate for agriculture. It is, of course, inconsistent with the basic principles of a university for such an institution to become a public policy advocate for a particular segment of society,” Castle said.

Schools and colleges of agriculture tend to be “captured” by those they are designed to serve, but so are other schools and colleges, such as law, medicine, and journalism.

Castle said land grant universities have provided less support for public policy research and education than for production-related research and education.

“Policy research often results in controversy and criticism, which often comes from those who have been major supporters of the schools and colleges of agriculture within the land grant universities. Prudence might suggest that it is better to avoid support of those personnel and projects which are likely to have such controversial outcomes. However, I do not believe such a viewpoint is consistent with the purposes of a university,” Castle said

He outlined five steps that necessary to create a “contemporary” land grant university. The first is to define a mission. Ideally, this mission could be defined by Congress or a state legislature, but it could also be defined

by a university president or group of university presidents. The mission should incorporate resident and nonresident education and related research, and reflect the increased interdependence of society.

The next step is to identify the constituents of a land grant university, which may include groups and organizations that have not previously been included, such as low-income residents in nonmetropolitan areas.

The third step is to make the mission a university-wide endeavor, not just the responsibility of a few academic units. This would facilitate the use of knowledge to solve local problems and, in the long run, enrich the scholarly journals.

The fourth step involves citizen involvement in establishing university programs. "There is evidence that this part of the program is not working as well as it once did," he said, noting that citizen participation was a major reason why the land grant universities were productive. Participants should represent all interests affected by land grant university research and educational efforts, some of whom may not have been involved previously. "In the final analysis, the university must be responsible for its program, but it can be a contemporary land grant university only if it is open to external information and takes seriously information which comes from groups affected by its work," Castle said.

The final step in defining a contemporary land grant university involves close coordination among resident instruction, off-campus education, and research. He said Extension programs have often lacked adequate research support and

**The constituents
of a land grant
university may
include new
groups and orga-
nizations.**



**"The differences
among us are so
fundamental that
reasoned argu-
ments and fact
finding will not, by
themselves, solve
our problems."**

research program have "often been driven by academic disciplinary considerations and tradition rather than social need."

A land grant university reorganized according to these principles would quickly discover that the management of public lands involves low-income groups, the issue of preservation versus production, as well as trying to resolve conflicts between environmental groups and producers, Castle said.

"It would also be discovered that we are far from reaching a social consensus with respect to what we seek from the public lands," Castle added. "The differences among us are so fundamental that reasoned arguments and fact finding will not, by themselves, solve our problems."

Instead, Castle advocated public land policies that incorporate new interests and new information.

"Few are likely to be satisfied completely by such policies, but they are necessary if we are to practical, useful, and if we are to protect ourselves from large mistakes."



FEES on Public Lands: Not All Users Pay a FAIR SHARE

Is this any way to run a railroad? Fees vary widely. Some pay full fare, others pay next to nothing. A few apparently ride free. And no one seems to agree on the destination.

That about sums up the situation on public lands—the methods used to assess fees don't make much economic sense, no matter how you look at them.

The recent wrangling over grazing fees may conceal larger inequities associated with how we charge for the use of public lands. "When costs are compared to returns, essentially all users of public lands are subsidized to some degree," said USU economist E. Bruce Godfrey. That might not be bad if the subsidies were equally apportioned, but they're not. Essentially, users compete for public lands on "a playing field that isn't level," Godfrey said.

Not that it's supposed to be that way. In the Federal Land Policy and Management Policy Act of 1976,



**"Essentially
all users of
public lands
are subsidized
to some
degree."**

Congress declared that “it is the policy of the United States...that the United States receive fair market value of the use of the public lands and their resources unless otherwise provided by statute...”

Godfrey reviewed several trends that affect revenue derived from public lands, among them a shift in the use of land administered by the Bureau of Land Management and the Forest Service from timber production and grazing to recreational uses (Table 1). Because recreation provides little of the income for these two agencies, the shift to recreation is likely to reduce income to those agencies and to the communities that rely on revenue sharing from public lands. In Utah, 41 percent of the public land is administered by the BLM and 15 percent is administered by the Forest Service.

Table 1. Changes in the use of public lands

Bureau of Land Management		
	1961-1976	1976-1991
Timber (mbf)	+16%	-51%
Grazing (AUM)	-15%	-6%
Recreation (RVD)	—	+94%
Forest Service		
Timber (mbf)	+14%	-12%
Grazing (AUM)	+88%	-16%
Recreation (RVD)	+126%	+33%

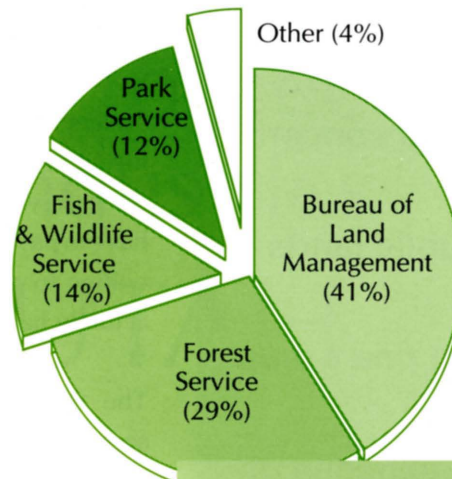
**Current policies
fall far short of the
congressional
mandate to base
fees on fair market
value.**

Godfrey said it’s difficult to determine “fair market value” for many commodities derived from public lands. Nonetheless, his analysis clearly showed that current policies fall far short of the congressional mandate.

For example, data from one of the few studies* designed to compare costs and returns associated with uses of public lands indicated that grazing and recreation don’t cover administrative costs (Table 2).

“If public lands were managed like a business in which the costs of production were covered, grazing fees would increase somewhat but there would be a greater increase in recreational fees,” Godfrey says.

Percentage of federal land administered by agency, 1992



Covering costs is only one method that's used to assess fees, however. Godfrey compared fees if all users paid on the same basis. For example, grazing and recreational fees would increase by applying the method used to determine the value of timber (appraisal and bid) while applying the method used to determine mineral fees would decrease grazing fees for sheep to 62 cents per animal unit month (AUM) but would increase grazing fees for cattle to \$4.13 per AUM. Recreational users would pay substantially more in both cases.

Fees for all other uses would plummet by applying the method used to assess recreational fees. "If you take the recreational fees received by the Forest Service and the Bureau of Land Management and divide them by the total recreation visitor days (RVD), the Forest Service gets about 5 cents per RVD, the BLM receives about 3 cents and the Park Service receives about 50 cents," Godfrey said.

Those who do not have to pay for the use of public lands tend to inflate the amount they are willing to pay.

Table 2. Costs and receipts from Department of Interior lands by activity, 1978 (Millions of \$)

	Returns	Costs	Difference
Timber	195.4	47.2	+148.2
Grazing	16.2	91.4	-75.2
Recreation	17.5	268.3	-250.8
Oil & Gas (on shore)	353.5	38.7	314.8
Coal	11.3	39.1	27.8
Other mineral	39.8	28.0	11.6

Source: Nelson

Policy decisions are also muddled by the difference in the value that recreationists say they are willing to pay (and probably *won't* have to pay) and the value that actual users say they are willing to pay (and probably *will* pay).

**Many of the
changes concern-
ing public lands
benefit one group
at the expense of
another group.**

"Users who have to pay for the use of public lands have an incentive to deflate the amount they are willing to pay, as is the case with grazing fees. However, those who do not have to pay have an incentive to inflate the amount they are willing to pay because there is little chance that they will actually have to pay," Godfrey said.

The methods used to assess fees have a variety of secondary effects. For example, the availability of recreational opportunities on public lands at little or no cost stymies the development of recreational enterprises on private land in the West, Godfrey said. And a recent USU study also suggested that the costs (police and fire protection, garbage disposal, etc.) exceed the revenue that

some local communities derive from the recreational use of public lands.

It's important to remember that public land decisions involve people as well as land resources, Godfrey said. "A good share of the changes concerning public lands tends to benefit one group of individuals at the expense of another group."

Godfrey contended that the inability or unwillingness to rationally assign an economic value to these resources and the failure to make users pay for the benefits they receive makes it more difficult to make sound decisions about the management of public lands.

KG

E. Bruce Godfrey 750-2294

*Nelson, R.H. "An Analysis of 1978 Revenues and Costs of Public Land Management by the Interior Department in 13 Western States." 1979. Unpublished paper, Office of Policy Analysis, United States Department of the Interior.



In the Short Term, Grim Prospects for Extractive Industries



in UTAH

Burgeoning global trade means that the value of Utah's natural resources is closely linked to the global economy. And there's good and bad news associated with this trend.

The good news is that demand for natural resources is higher than ever. Moreover, an increased environmental awareness has led to regulations that have markedly curbed the smoke, soot, and other pollution associated with extractive industries in the U.S.

The bad news is that these environmental regulations have increased costs of domestic production, "displacing" production to other countries where environmental regulations are less stringent or nonexistent.

The net result is more global trade—and a huge global environmental crisis. The environmental carnage won't end—and the economic fortunes of timber production and mining on public lands won't improve—until all countries attempt to protect environmental quality, thereby creating the proverbial level field that's a prerequisite of fair competition, said USU economist Robert Lilieholm.

**The environmental
carnage won't
end—and the eco-
nomic fortunes of
timber production
and mining on
public lands won't
improve—until all
countries attempt
to protect environ-
mental quality.**

Economists generally tout the benefits of free trade, which has gotten freer in recent years with the removal of trade barriers. Worldwide, average tariffs on imported goods are 5 percent today compared to 40 percent in 1947. Lilieholm said this trend is likely to continue with regional trade pacts such as the North American Free Trade Agreement (NAFTA).

Even though more than 140 international treaties have been adopted since 1921, most in the last two decades, the environmental degradation in many developing countries is accelerating, leading to pollution, loss of species, ozone depletion, global warming, soil erosion, and desertification on an unparalleled scale.

Environmental regulations in the U.S. have been beneficial, Lilieholm contended, citing improvements in resource management and in air and water quality, as well as declines over the last few decades in particulate emissions (a 60% decline), sulfur dioxides (38%), carbon monoxide (30%) and lead (almost 90%). Those benefits shouldn't be scrapped in an attempt to bolster production from U.S. public lands, Lilieholm said. It's far better to encourage environmental protection elsewhere than to reverse environmental gains here.

Nonetheless, it may be several years before this occurs, and in the interim, producers in other countries will probably have an economic advantage, as was evident in a recent USU study of the effects of applying more stringent timber harvest laws in the U.S.: If the forest regulations in Washington State (among the world's strictest) were applied to all of the Pacific Northwest, the region's timber production would decline by 20 percent.

However, prices wouldn't increase because producers in other countries, largely in those with lax environmental regulations, would increase production.

"Environmental protection laws are the toughest for many natural resource-based industries, because most environmental damage occurs in the initial stages of production. As a result, this is where displacement is likely to occur. Yet these industries, which often rely on public lands, provide the economic base for many rural communities," Lilieholm said.

"Developing countries have increasingly become exporters of raw materials to the industrial world. These countries are often willing to tolerate tremendous environmental damage for foreign exchange, and their economies have become increasingly dependent on the export of raw materials. Today, more than a quarter of the world's physical trade is composed of raw materials like coal, timber, fish, and minerals."

The real question is how long can we afford to rely on other nations for our basic resources, especially considering our staggering trade deficit, which is expected to exceed \$100 billion this year. These factors may encourage efforts to reduce consumption and to substitute more ecologically benign products for imports.

In addition to encouraging global standards of environmental protection, Lilieholm said the public needs to recognize that consumption has increased our reliance on basic natural resources, even in today's service economy and post-industrial society. It's also important to recognize that some environmental policies

**If the forest
regulations in
Washington State
were applied to all
of the Pacific
Northwest, the
region's timber
production would
decline by 20
percent.**

place an especially heavy burden on rural communities, minorities, and the poor.

Altering federal revenue-sharing agreements to payments based on, for example, recreational use instead of timber harvest, could also help rural communities make the transition from extractive to service-oriented economies. Researchers can also help rural communities to encourage secondary manufacturing and to diversify their economies.

"The bad news is that resource-based extractive industries in the U.S. will probably continue to decline in the short-term, and so will many rural communities.

"In the long run, however, environmental protection and economic development are mutual endeavors. However, the adjustments necessary to support both will take time," Lilieholm said.

KG


Robert Lilieholm 750-2575

**Today, more
than a quarter
of the world's
physical trade
is composed of
raw materials
like coal, tim-
ber, fish, and
minerals.**



Public Lands

Often Not the **Key**



to Rural

Economic Development

Some arguments are good for cleansing the soul but not for arriving at solutions. As far as rural economic development is concerned, many of the squabbles over public lands seem to be in that category—they generate a lot more heat than light.

Debates over the fate of public lands often divert attention and resources from efforts that could really foster rural development, said Richard Krannich, USU sociologist. He contended that public lands aren't the key factor governing economic growth in most rural areas of Utah, even in communities adjacent to public lands.

The real impediments to economic development are the same in most rural areas of the country—dependency, globalization, and limited rural capital, he said. Communities that address those issues can increase their chances to nurture economic growth that is consistent with community values.



Krannich explained that there are several types of dependency.

One involves the inability of communities to control their own economic destiny. Many of the decisions governing rural economic growth are made by firms and government agencies at other locations, far removed from local communities, Krannich said. A community should involve these outside institutions in its economic development plans.

Another involves resource dependency, which is reliance on a single natural resource commodity or enterprise. In spite of impressions to the contrary, surprisingly few communities in the West depend on a single resource. For example, only two Utah counties are classified as agriculture-dependent and only three Utah counties are classified as mining-dependent. (Dependent counties are those deriving at least 20 percent of personal income from these enterprises.)

Thus, relatively few communities in Utah are dependent on the resources derived from public lands.

Percent of population age 65 and older, Wasatch Front and selected rural counties

Wasatch Front Counties (Davis, Salt Lake, Utah

Weber)	8.1%
Beaver Co.	16.3%
Carbon Co.	13.4%
Garfield Co.	14.0%
Grand Co.	12.4%
Juab Co.	13.6%
Kane Co.	13.8%
Piute Co.	19.4%
Sanpete Co.	13.2%
Sevier Co.	13.6%
Washington Co.	16.3 %
Wayne Co.	15.4%

Moreover, the creation of global markets has further diminished the ability of rural areas to control their economic fate, as have other social and political developments. "Considering the social and political realities of the 1990s, 'nontraditional' stakeholders—including those who may live thousands of miles away from public lands in Utah—will often have greater clout and influence over the management of public lands. Ignoring this fact is somewhat like tilting at windmills," Krannich said.



**Those living
thousands of
miles from public
lands in Utah are
likely to become
more influential in
determining how
public lands are
managed.**

cutthroat competition among communities and hefty concessions to these industries. Moreover, there are slim chances of successfully attracting these enterprises. The economic gains associated with some types of industries may be dwarfed by the accompanying social costs.

Krannich cited a decline in residents' satisfaction during the construction of a power plant in Delta, Utah, as an example of the erosion in quality of life that can be associated with some types of economic development. Other unpalatable development options include hazardous waste sites and the "Aspenization" that can accompany excessive development based on recreation and tourism.

- **"Grow" local jobs.** These include value-added industries, such as manufacturing cabinets instead of exporting lumber, "incubator" programs for local businesses, and the creation of business marketing networks.

- **Employ development plans that encourage citizen participation and conflict resolution.** This is essential to coalesce support and to minimize the likelihood of misunderstandings that could foster opposition and community conflict over development efforts.

- **Cooperate on a regional basis.** Several communities in Utah are already collaborating on development efforts, including a program in Sanpete County and the Basin

West 2000 Action Team in the Uintah Basin.

- **Determine what resources are available and what type of assistance is needed.** Assistance is available from USU's Community Resource Development Program. Grants are available from several government programs, including the Small Business Research Initiative and the USDA National Research Initiative Program.

KG

Richard Krannich 750-1241

Many rural areas also lack other resources that encourage economic growth. Due to the legacy of trends such as outmigration, some communities lack a young, well educated labor force. Many rural counties have a high proportion of elderly residents. Others lack the financial resources to capitalize on development opportunities. Distance is another handicap—some areas are simply too far from highways, telecommunications systems, and other services that attract industry.

Krannich emphasized that public lands make important contributions to economic conditions, but are usually not the sole—or the major—engine for economic growth. He reviewed several steps that communities can take to encourage economic growth:

- **Determine how various uses of public lands actually affect economic development.** “In spite of the rhetoric and emotion, there’s little solid evidence regarding how public lands management either encourages or discourages economic development,” Krannich said. USU studies of the economic impact of wilderness designation and of expenditures by visitors to national parks will provide information that will be useful in targeting development efforts.

- **Study innovations that can improve the efficiency and profitability of rural enterprises.** For example, a USU study of ranchers’ willingness to adopt new practices might identify ways to markedly improve returns on ranches. Several other alternative rural enterprises, such as game management on private land, might also be profitable

- **Identify realistic development alternatives.** The traditional approach, in which communities try to lure industry from other regions, often involves

The economic and social well-being of many rural communities, even those surrounded by public lands, may depend more on their efforts to foster economic growth than on policies concerning public lands.

Reducing the Risks of Natural Toxins

Prefer natural foods?

Then how about food laced with seneciphylline, monocrotaline, heliosupine, or retronecine, all completely natural—and all toxic?

Not appetizing? Those are just a few of the unsavory compounds produced by plants, some of which end up in herbal teas and folk remedies, and in a variety of livestock feedstuffs, including rangeland plants

These types of all-natural compounds can cause liver, kidney, lung and cell damage, or even death. The exact toll is difficult to determine because other, more subtle effects, such as reduced rate of gain in livestock, often escape notice.

We tend to worry much more about “man-made” toxins such as pesticides even though on a weight basis, our diet contains about 10,000 times more of these natural toxins, says USU toxicologist Roger Coulombe.

Coulombe studies the molecular action of two types of natural toxic compounds, pyrrolizidine alkaloids (PAs), which are produced by plants such as tansey, comfrey, hound’s tongue, and groundsel, and aflatoxin B₁, a toxic and carcinogenic agent

produced by a fungus that can contaminate cottonseed, corn, peanut, wheat and other commodities.

PAs, which cause significant livestock losses in the Intermountain region, may make up as much as 18 percent of a plant’s dry weight.

“Pyrrolizidine alkaloids are very toxic, but some act much like known anticancer agents,” Coulombe says. Determining the molecular action of these compounds might identify native plants that produce new anticancer agents.

PAs are not toxic until enzymes in the liver and other organs metabolize them to either a reactive form (pyrroles) or to a less toxic form (N-oxide). Cattle and horses, which are sensitive to the effects

Awards & Honors

Doyle J. Matthews, former dean of the USU College of Agriculture and director of the Utah Agricultural Experiment Station, received the Distinguished Service in Agriculture Award for 1993 from Kansas State University. The award recognizes those who have made outstanding contributions to a professional field or in public service related to agriculture. Matthews retired as dean and director in 1991.

David Walker and **Jack Evans** are members of the board of directors of the Council for Agricultural Science and Technology, a nonprofit educational organization that serves as a “scientific voice on behalf of agriculture.”

Walker retired from USU in 1992. Evans is weed scientist in the Plants, Soils & Biometeorology Department.



of PAs, probably produce a higher proportion of the more-toxic pyrrole than do sheep, which are resistant, and probably produce a higher proportion of the less-toxic N-oxide.

Coulombe studied 15 PAs, many produced by rangeland plants, and identified several structural characteristics that are related to their ability to cross-link DNA, the joining of either two strands of DNA or of a DNA strand and a protein molecule. Those forms that were most potent cross-linkers were also the most toxic.

He is also studying the enzyme, glutathione S-transferase, which appears to be related to an animal's resistance to aflatoxin. So far, about a dozen forms of this enzyme have been identified in animals and humans. For example, hamsters have a form of

the enzyme that seems to "trap" aflatoxin so it can be harmlessly excreted.

Coulombe says understanding the different forms of glutathione S-transferase might make it possible to genetically engineer livestock that are resistant to aflatoxins. Such a technique would be particularly beneficial for poultry, which are extremely susceptible to aflatoxins. Results will also help in develop tests to screen for aflatoxins in feedstuffs and foods.

Coulombe stresses that American agriculture produces the world's safest supply of food. His findings will make food even safer by reducing the adverse effects of many naturally occurring toxins.

KG

Roger Coulombe 750-1598

Jointed Goatgrass: Similarities to Winter Wheat Hamper Control

Dryland winter wheat producers have a real fight on their hands.

Jointed goatgrass has been lurking for decades, but only in recent years has it aggressively invaded grain fields in Utah. It now infests about one-fifth of the 270,000 acres of small grains in the state, in addition to fallow land, rangeland, and roadways.

So far, the weed has the upper hand, says USU weed scientist Jack Evans, who is studying control based on integrated pest management tactics involving tillage, burning, and herbicides. Growers must employ a variety of tactics to keep the weed at bay, none are completely effective.

Winter wheat is especially vulnerable due to similarities in the weed's life cycle. Like winter wheat, jointed goatgrass seedlings emerge in the fall, overwinter, and regrow in the spring.

The weed's close genetic relationship to wheat hampers control—herbicides effective against the weed also kill wheat. Jointed goatgrass also crosses with wheat, forming hybrids that are usually sterile.

Evans says infestations often reduce yields by about 20 percent, far more than a grower's profit margin. In some areas, infestations commonly reduce yields by 50 percent. Just one goatgrass plant per square foot can reduce yields by 3 to 5 percent.

(Continued on page 86)

Recent Grants & Contracts

Frank Salisbury, Plants, Soils & Biometeorology Department, has received funding from the National Aeronautics and Space Administration to conduct experiments on the Russian space station Mir. The Lockheed Engineering & Sciences Company supports his study of diets suitable for a controlled ecological life-support system.

Lynn Dudley, Plants, Soils & Biometeorology Department, is planning a symposium on the sources, control and remediation of oxyanions in agroecosystems with support from the Cooperative State Research Service (USDA).

The National Institutes of Health supports the research of **Robert Sidwell**, Animal, Dairy & Veterinary Sciences Department, concerning the in vitro screening of drugs against respiratory viruses.

Brent Miller, Family & Human Development Department, is developing a program to help families talk about sexuality. His work is supported by the Office of Population Affairs, Public Health Service, Department of Health and Human Services.

Joanna Endter-Wada, Forest Resources Department, is participating in a study of the social and economic implications of resource management policies on fish harvesters in the Santa Barbara channel (California) with support from the Mineral Management Service, U.S. Department of the Interior.

Gary Belovsky, Fisheries & Wildlife Department, is studying how food abundance, competition, and predation limit grasshopper populations. His research is funded by the Animal and Plant Health Inspection Service (USDA).

The Agricultural Research Service (USDA) supports the research of **John Carman**, Plants, Soils & Biometeorology Department, involving apomixis in rice.

Keith Mott, Biology Department, studies the limitation of nonsteady-state photosynthesis by Rubisco with funding from the Cooperative State Research Service (USDA).

Gary Straquadine, Agricultural Systems Technology & Education Department, is studying the curriculum in agricultural education with support from the Utah State Office of Education.

Kay Asay, Forage & Range Research Laboratory (USDA), is evaluating cool-season forages. His research is supported by the Agricultural Research Service (USDA).

Don Jensen, Utah Climate Center, is helping develop a range and forage assessment procedure for the western states with support from the Desert Research Institute.

Dani Or, Plants, Soils & Biometeorology Department, studies drip irrigation management with support from the United States-Israel Binational Agricultural Research and Development Fund and is assisting in the statistical analysis for the Inyo County (California) Water Department.

Richard Krannich, Sociology, Social Work & Anthropology, is assessing the needs of an aquatic resource program. The study is funded by the Utah Division of Wildlife Resources.

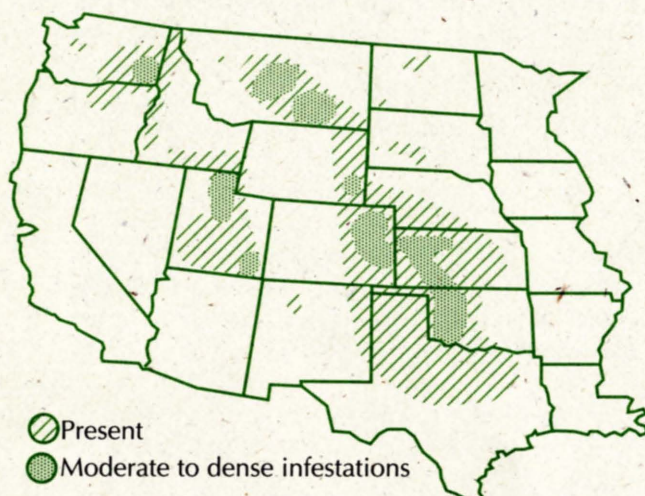
Fred Provenza, Range Science Department, is studying the importance of food and companionship in choice of foraging location by sheep. The study is funded by the Cooperative State Research Service (USDA).

Janis Boettinger, Plants, Soils & Biometeorology Department, studies the efficiency of zeolite use in the reduction of nitrate contamination from animal manure. Funding is provided by the Cooperative State Research Service (USDA).

Ann Austin, Family & Human Development Department, trains child care providers with support from the Utah Department of Community and Economic Development.

Deloy Hendricks, Nutrition & Food Sciences Department, evaluates the in vivo biopotency of chromium-containing complexes. His research is funded by Monarch Nutritional Laboratories.

Distribution of Jointed Goatgrass in the U.S.



"I don't like to say this, but no-till or reduced-till techniques are probably the worst type of tillage program for controlling goatgrass," Evans says. So far, his research shows that the best combination involves conventional tillage (chisel plowing in the fall, followed by several rodweedings during summer fallow), coupled when necessary with herbicide applications (glyphosate is the most effective). Even so, some jointed goatgrass is likely to appear later because its seeds survive in the soil for at least 5 years.

Burning crop residue can destroy most jointed goatgrass seeds that remain on the soil surface after harvest, but normal burning does not affect buried goatgrass seeds. Furthermore, it is seldom an option because it increases air pollution and the risk of erosion.

Basic sanitation is essential. This includes cleaning fencerows, covering grain with a tarp as soon as it leaves the field to prevent scattering of goatgrass seeds, and cleaning equipment, especially combines.

One of the best tactics is to plant certified seed. Wheat seed must be free of jointed goatgrass in order to be eligible for certification. According to a recent drillbox survey in Utah, many growers planting non-certified seed are sowing their own problems: 10 percent of the wheat seed sampled contained jointed goatgrass seeds.

The emergence of jointed goatgrass as a serious problem doesn't appear to be linked to increased aggressiveness of the weed. Infestations on CRP and set aside acreage appear to be at least partially responsible, Evans says.

Researchers in other states are determining whether wheat height and density, or morphological characters are related to its ability to compete with goatgrass. Shorter crop rotations, increased use of fertilizer and a reduction in tillage also appear to favor the weed. The similarities with wheat hamper biological control.

"One of the least expensive and most effective methods of control would be a selective herbicide," Evans says. He believes such a selective herbicide may exist or can be developed. Some seed companies are also trying to incorporate genes for herbicide-resistance into wheat, thus making it possible to kill goatgrass without harming wheat.

Until then, growers have to keep whittling away at the problem.

KG

Jack Evans 750-2242



Clair R. Accord

Recipient of 1993
Land Grant Hall of
Fame Award

Clair R. Accord received the Land Grant Hall of Fame Award during this year's Land Grant Days. The Land Grant Hall of Fame Award recognizes those who foster productive relationships between USU and its constituents.

Accord's service to Utah agriculture spans more than 50 years. After earning a BS degree from USU in animal science, he was an instructor of vocational agriculture and worked for the Farmers Home Administration. He earned an MS degree from the University of Illinois and a PhD degree from the University of Kentucky.

As livestock specialist for the Utah Cooperative Extension Service, he developed an internationally known program of pasture management and parasite control. He started the state's first central bull test station and was widely known for his expertise in livestock judging.

He also served as Executive Secretary of the Utah Wool Growers Association and as a farm credit mediator for the Utah Department of Agriculture.

Previous recipients of the award were C. Booth Wallentine, Allan Adams, and Deloris Stokes.

Panelists Endorse Objectivity as USU Goal

As long as it pursues the truth, a land grant university has little to fear by tackling issues that concern public lands, according to participants in a panel discussion held during Land Grant Days.

Even though they endorsed USU's commitment to scientific objectivity, some panel members questioned the propriety of researchers entering the political arena. Others worried that attempts to serve new constituents, although necessary, might alienate the university's traditional supporters.

"I do not believe that a public university should be an advocate for any particular group. It needs to be equally credible to all of the interest groups that are affected by its work," said Ted Stewart, executive director of the Utah Department of Natural Resources.

"The university has a responsibility to resist fads, to eschew politically correct and conventional wisdom, or romantic interpretations of nature. These interpretations may be partly true, but they are essentially subjective," said Hardy Redd, a rancher and a former state legislator from La Sal, Utah.

"When it comes to research, I like to think that science is not Republican or Democratic, liberal or conservative," said Denise Meridith, deputy director of the Bureau of Land Management.

However, Ed Marston, publisher of *High Country News*, criticized land grant universities for their failure to tackle controversial public policy issues, including those concerning public lands.

"My desire is not to see the land grants become a Sierra Club or the Audubon Society—we already have perfectly good advocacy organizations—but rather to see the land grants allow their professors to enter in on all sides of these public policy debates," Marston said.

He accused land grant universities of avoiding involvement in issues such as land use planning.

"Even though it's the schools of agriculture that are in danger of losing the agricultural and natural resource base to subdivisions, they cannot think about that question because their constituents won't let them think broadly about how we ought to come together as a community to plan."

The value of objectivity extends far beyond the campus.

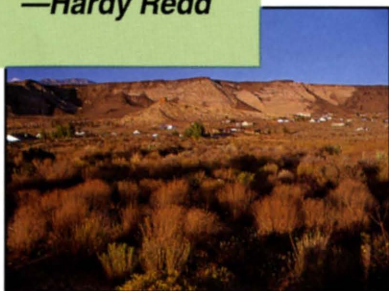
Natural resource agencies must balance competing interests such as wildlife and private property rights, require employees who are trained "in such a way that they have not been tainted or corrupted or biased. They have to do good science. And this world, this country is desperately in need of good science," Stewart said.

**"The university has
a responsibility to
resist fads, to
eschew politically
correct and conventional wisdom,
or romantic
interpretations of
nature."**

—Hardy Redd

**"Scientists have
to go into the
public arena
sometimes to
make sure their
science is under-
stood.**

—Hardy Redd



"This is not the government of the biologists, for the economists, and by the lawyers. The real policies are to made by the people who face the electorate," he added.

It's often not enough to simply conduct research, however. "Scientists have to go into the public arena sometimes to make sure their science is understood," Marston said. "It's one thing to do research and put it on the shelf. It's another thing to actually figure out how to enter the public policy arena."

Emery Castle, an economist from Oregon State University, said he wasn't overly concerned about controversy, or about land grant universities giving researchers the freedom to investigate difficult problems. He said most administrators have protected the right of faculty members to study controversial issues.

Stewart stressed the importance of separating information from advocacy. "You can't have scientists trying to make policy, and you can't have policymakers making up their own science."

Thad Box said he resisted political attacks on faculty research while serving as dean of the USU College of Natural Resources. "Unless this system will give us the academic freedom to search for truth, wherever it leads us, then your university is no good to you."

Several panel members said the university could hone its ability to gauge citizens' concerns, and could improve the feedback that guides research and Extension efforts.



Although conflicts between production agriculture and environmentalists now attract a lot of attention, "these may not be the main issues. Such things as jobs for the poor and social justice may overshadow both of these things," Box said.

"Public land problems offer a real opportunity for us to reconstitute a land grant university and to return to the basic land grant tradition," he added.

"There's a crying need for a much more strenuous outreach for those groups who have recently become interested in public lands, and for political special interest groups, such as the Sierra Club," Redd said.

The educational mission of land grant universities was also scrutinized.

Land grant universities should continue to serve the rural poor and the disadvantaged, Box said. Redd stressed the importance of a broad, liberal education, one that teaches skills that facilitate cooperation and problem-solving.

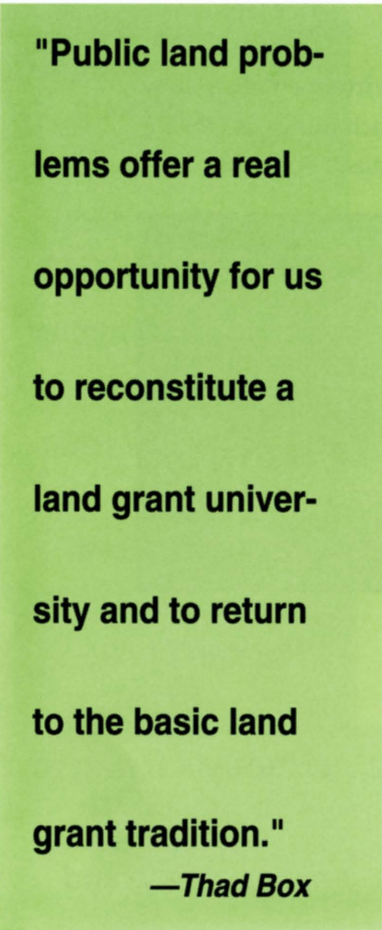
"When a rancher's son comes home after expecting to learn how to ranch, and tells his father that he's learned in philosophy class that the world is a lot bigger than he ever realized, then the university has done its job," Redd said.

Panelists also stressed the value of internships, seasonal employment, and cooperative education for students, many of whom lack practical experience in natural resource occupations.



**"You can't have
scientists trying to
make policy, and
you can't have
policymakers
making up their
own science.**

—Ted Stewart



"Public land problems offer a real opportunity for us to reconstitute a land grant university and to return to the basic land grant tradition."

—Thad Box

Meridith said the BLM was eager to expand their partnership with land grant universities, but several panelists worried that the federal funding may limit university autonomy. "There is always a danger that you lose control of the mission of the university," Castle said.

Land grant universities should also help resolve differences about issues such as ecosystem management. Meridith said the BLM's definition of an ecosystem definitely included people, although some scientific definitions do not, and cited efforts to eliminate the "artificial and intimidating line dividing fauna and flora, between state, federal land local jurisdiction, and between natural and cultural ecosystems."

Box recommended forums to identify the economic, ecological, human and physical tradeoffs involved in ecosystem management. "I attend many meetings where well-meaning people use the same words, but mean completely different things," a problem that is exacerbated by the poor coordination between local, state, and federal agencies.

KG

Wilderness Designation: Economic Effects Often Depend on LEGAL DEFINITIONS

Most people seek refuge in wilderness from paperwork and legal minutiae, but these are the very types of growth that have sprouted up around wilderness proposals. Wilderness may have connotations of primitive simplicity but carving out a wilderness area today involves some pretty rough legal terrain.

USU researchers studying the economic impact of wilderness designation in the state have had to hack their way through a thicket of uncertainties from the start. "Because the acreages weren't defined in some of the wilderness proposals, it was a real challenge to determine where some wilderness areas are even located," said economist Donald Snyder. Researchers have also dealt with discrepancies between how legislation is framed and how it is implemented.

"We need to determine what the law says. We also need to know how a law is applied, and whether it will be applied uniformly across wilderness areas" Snyder said.

Initial findings indicate that wilderness designation probably won't spur major economic growth. Wilderness users do spend money, but there are relatively few users.

The USU study, which will be completed in mid-1994, examines the economic impact of wilderness on local areas. Final results will be publicized only after they have been subject to peer review, a process likely to take several months. Snyder emphasized that the study will not give specific recommendations regarding any of the proposed wilderness areas, nor will it provide much information about the concerns or attitudes of local businesses.

Preliminary findings from three of the five wilderness study areas that have been intensively studied indicate that visitors to wilderness spend about as much per visit as other types of recreationists, such as off-road vehicle users, but the economic impact of this type of recreation is relatively small because there are relatively few visitors. "Yes, these users do spend money, and yes, communities can try to take advantage of these expenditures, but, no, you will not build a local economy on wilderness users. At least as far as our initial data is concerned it's not going to be a source of major growth," said economist John Keith.



Most of the users were male, white, middle-aged (30- to 55-years old) well-educated, and wealthy. Most were executives, administrators, or professionals. Unlike similar studies that have found that most wilderness users come from nearby areas, most visitors to wilderness areas in southern Utah were from other Western states—wilderness areas in eastern Utah attracted more users from Colorado and wilderness area in western Utah attracted visitors from California.

The impact of "buffer zones" around wilderness is another gray area. Even the concept is a source of disagreement—wilderness advocates claim they don't exist and wilderness opponents contend that they do exist, or will be created.

There's some evidence to support both views, explained economist Robert Lilieholm. Even though buffer zones aren't defined in legislation, there are several cases in

which federally protected land, such as a national park, has affected the use and management of adjacent land. Lilieholm cited the Everglades National Park, where farmers have been forced to modify agricultural practices to improve water quality in the park. Geothermal regulations have also been proposed to protect the geysers in Yellowstone National Park.

Opponents and advocates of wilderness are worried about how wilderness designation will affect economic development on surrounding areas, and are concerned about such factors as predator control, mining, timber harvest, fire management, migratory animals, scenic values, weed control, air quality, and water rights.

The issue of buffer zones now appears to hinge on an effort to protect ecosystems. "Historically, we have drawn lines around areas that we wanted to protect, which was effective as long as development pressures in surrounding areas weren't too intense," Lilieholm said. Now, however, the "preservation paradigm" has changed to ecosystem management. However, there's still wrangling over the definition (some exclude humans) and the scale of an ecosystem.

Lilieholm says federal agencies are trying to arrive at a realistic definition of ecosystems, one that balances ecological viability, economic feasibility, and social responsibility.

It is possible that wilderness areas may function as ecosystem cores, a system popular in many developing countries. Such a system was recently implemented in

**"Buffer zones"
aren't defined in
legislation, but
they may still af-
fect the use and
management of
wilderness areas.**



Mineral exploration and production will probably be affected more by market forces than by wilderness designation.

New Jersey, where protection of a core area of public land is coupled with restrictions on development on adjacent land. The New Jersey system also compensates those who are affected by restrictions on development.

Wilderness designation has also muddled the issue of water rights. Until now, competing claims on water have been resolved by negotiations between federal agencies and state governments, said economist Jay Andersen. However, recent Colorado legislation appeared to tighten federal claims to water.

Andersen is also studying how federal claims to water in wilderness areas might affect in-stream flow requirements, watershed management (water yields depend on the type of vegetation, for example), and possible restrictions on dams, and water divergences and conveyances.

Attempts to determine the effect of wilderness designation on mineral exploration and development have been hampered by a lack of information, said economist Chris Fawson, who has visited firms and individuals around the state, and has scoured government and industry publications in search of information. "The real cost of wilderness designation in the mining sector will result from restricting access to information about the extent of mineral resources in withdrawn lands," he said.

There is evidence that market forces will affect current and planned mineral exploration and production more than will any restrictions due to wilderness designation. Fawson noted that estimates of potential mineral reserves are usually inaccurate and change dramatically with economic conditions, geological theories, and new exploration technology. This means that any projection of tangible losses will probably not be very reliable.

During 1992, the value of mineral production in Utah was about \$1.9 billion—\$703 million in base metals (37 percent), \$469 million in coal (25 percent) \$440 million in industrial minerals (23 percent) and \$283 million in precious metals (15 percent).

Even though employment and income generated by mining appear to fluctuate considerably, much of that fluctuation occurs in Salt Lake County, which, due to Kennecott's Bingham mine, accounts for more than half of the state's mining-related income. However, in some rural counties, mining is a relatively stable segment of the economy.

"Overall, I think employment, production value, and tax base data suggest that mining is a regionally diverse—and sometimes significant—source of revenue for Utah's rural economies," Fawson said.

In theory, wilderness designation shouldn't have much effect on the use and management of grazing allotments since wilderness legislation contains provisions that allows ranchers to maintain and even increase the number of livestock, repair and construct facilities, and use motorized equipment and vehicles when necessary. Nonetheless, there are indications that wilderness designation affects the management of grazing allotments. Economist Bruce Godfrey is surveying ranchers whose allotments were included in areas designated as wilderness to determine whether this has occurred.

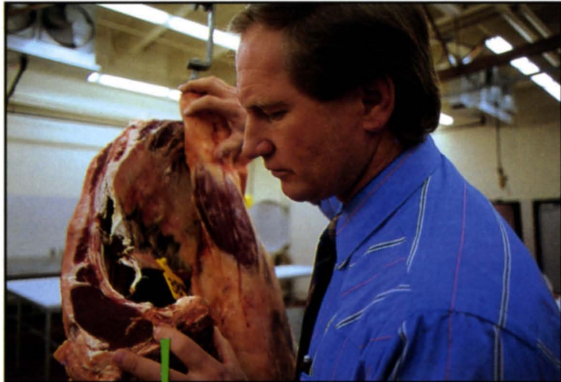
Another issue is the management of allotments that include part of a wilderness area. It's not known whether such a "split" allotment would be managed as a wilderness area, or a conventional grazing allotment. Such split allotments pose a difficult problem for public land managers.

Godfrey said that the wilderness designation may be a moot issue because substantial increases in grazing fees or other policies associated with grazing reform could prompt ranchers to vacate allotments, regardless of proximity to a wilderness area.

KG

Chris Fawson 750-2296
Bruce Godfrey 750-2294
John Keith 750-2303
Robert Lilieholm 750-2575
Donald Snyder 750-2305

Cattle Displaced from Rangeland May Find Home on



IRRIGATED PASTURES

Increased grazing fees and pressure to remove livestock from public lands may force ranchers to rely on privately owned irrigated pastures. The transition may be painful but experts say it could be profitable.

Before that happens, however, USU researchers have a lot to learn about the promise and pitfalls of grazing irrigated pastures, as they explained at a session held during Land Grant Days.

One promising alternative involves using these pastures to wean slaughter-weight calves. Animal scientist Randall Wiedmeier and graduate assistant Tod Shenton said the meat from these calves appears to be more healthful—it contains about 7 percent less cholesterol and more of the desirable polyunsaturated fatty acids—than conventionally raised beef, in addition to a five-fold reduction in total fat (2.6 percent vs. 12.9 percent). The practice also appears to fatten profit margins, even if a rancher decides to cut herd size to accommodate the loss of forage from public rangelands.

The system requires superior sires, artificial insemination, and larger cows (about 1,300 pounds) that produce between 15 and 25 pounds of milk per day (Table 1). With ample milk and creep feeding starting at 150 days of age, calves can weigh

1,100-1,200 pounds at 270 days of age. They remain with their dams about 30 days longer than usual

Wiedmeier has studied variations of this system for two years. "This year we weaned calves at 200 days that weighed between 800-900 pounds when they entered the feedlot," he said.

The male calves were not castrated, to capitalize on their more rapid growth (about 18 percent higher than steers or female calves), but packers paid only salvage price for them. Steer calves may be a better option, although more research is needed to determine how and when to castrate and whether anabolic implants will boost growth.



**With ample milk
and creep feed,
calves weighed
1,100-1,200
pounds at 270
days.**

Intact male calves had excellent yield grades but most had poor quality grades, usually USDA Standard, a reflection of the low fat content of carcasses. However,

Table 1. Selected performance characteristics of alternative production systems for beef calves.

Cold desert range operation (1990)*		Drylot study (1991)**				
Cow weight	Calf weaning weight	Milk produced by cows (lb/day)	Calf weaning weight	Creep feed consumed	Annual cost per cow	Breakeven price per lb required for calves
1,292	602	16.7	692	625	\$526	\$0.96
1,336	604	22.7	1,156	625	\$526	\$0.57
Irrigated pasture study (1992)**						
		23.7	1,135	825	\$475	\$0.54

*All cows bred to average bulls
**Results in bold involve cows bred to superior bulls.

**With this system,
the cost of pro-
ducing a pound of
beef on irrigated
pastures is about
half that on range-
lands.**



taste tests showed that consumers preferred meat from the male calves to meat from carcasses that graded USDA Choice.

A few part-Angus calves graded USDA Select, and Wiedmeier thinks adding some Angus blood might improve the quality grade. (Angus are known for their ability to deposit fat at an early age.) He is testing the theory this year by breeding half of the 20 cows in the herd to a top Angus sire instead of a Simmental.

“Marbling may not be as much of a problem in steer calves, but we still don’t know how their growth rate compares to that of bulls,” he said.

Another concern is the source of herd replacements. Wiedmeier says most females sired by growthy bulls are too large at maturity and may lack desirable mothering abilities. Of course, ranchers can purchase replacements. Another option—rely on replacements from young (1-2 years)

and older cows (more than 11 years old) and use cows 4-10 years old to raise slaughter-weight calves.

On paper at least, it appears that it’s slightly more profitable for a producer to wean slaughter-weight calves from a 130-cow herd on irrigated pasture than it would be to rely on weanling calves from a 300-cow herd that grazed 12,000 acres of public land for 5 months. In large part, that’s because production expenses per pound of beef are about half of those incurred on rangelands.

That's on paper, however. "This system of production definitely isn't an alternative for all producers, but we haven't found anything yet that indicates that it isn't feasible," he said.

There's also much to learn about forage production and utilization on irrigated pastures.

USU range nutritionist Kenneth Olson and agronomist Jennifer MacAdam noted that the nutrients harvested in hay may differ considerably from those gleaned by grazing animals due to diet selection by livestock and seasonal changes in the amount and nutritional value of forage.

Their goal is to produce a system of forage production compatible with the nutritional requirements of livestock and with climatic conditions in Utah. These systems have been developed for livestock producers in the Midwest who, for example, plant warm season grasses that compensate for the "summer slump" of cool season grasses.

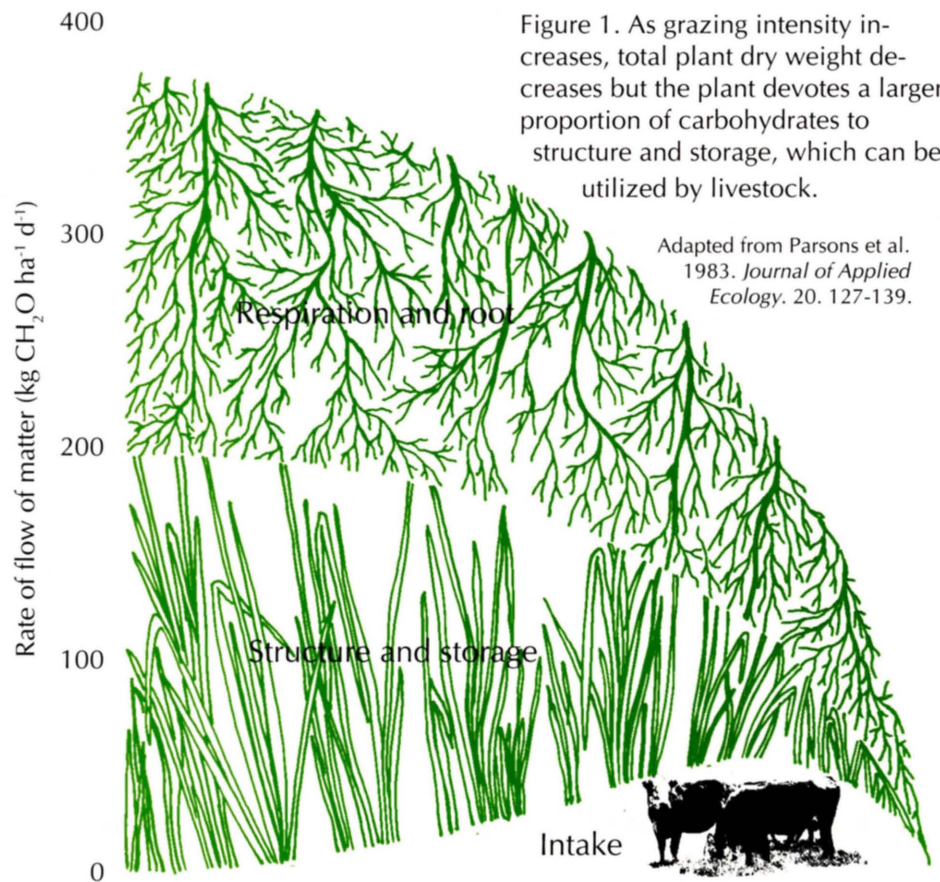
Olson is identifying forages that are suitable for irrigated pastures in Utah and is determining which of them seem to best meet the nutritional requirements of livestock. In cooperation with researchers from the USDA Forage and Range Research Laboratory, Olson clips, weighs and analyzes forage grown on small plots. He will then grow the best forages on larger plots and monitor the intake of fistulated livestock before studying livestock performance on pastures.

Climatic differences around the state and the season of use will also be considered. "Some forages, such as grasses that remain erect in the snow, may be suitable for winter grazing," Olson said, which could substantially

**Forages suitable
for winter
grazing could
substantially cut
the costs of
production.**

cut the costs of production. "In some cases, no forage will meet the nutritional needs of livestock and we have to consider supplementation.

"I have no doubt that we can increase the productivity of irrigated pasture, perhaps enough that some producers who rely on public land for part of the year can rely entirely on irrigated pastures," he said, and noted that the "cowboy" era of grazing—when cattle roamed over large tracts of land—isn't over, but it appears to be on the wane.



MacAdam noted that the same conditions in the state that favor the production of high-quality alfalfa—long, sunny days and cool nights—will also favor forage production on irrigated pastures. “Cool nights make the plant more efficient. Where night temperatures are higher, plants waste much of the carbohydrate that they produce during the day,” she said. Nonetheless, there are major differences between the architecture of plants harvested for hay and those for grazing.

The objective in hay production is to maximize the amount of dry matter—and that depends in large part on plant height. Vertical growth requires stems. This means forage must be harvested before stems mature and decrease hay quality. (See Figure 1.)

With grazing, the goal is to maximize livestock production, and that means that plant height—and therefore stems—isn’t as essential. “Leaves are the high-quality part of the plant. Basically, we try to maximize leaf growth in pasture production so an animal consumes dry matter of such a high quality that it’s almost a concentrate,” MacAdam said.

MacAdam plans to study five legume-grass combinations. The optimal mix consists of about 25 percent of a legume such as white clover, which produces a horizontal stem that remains at ground level. This percentage limits the risk of bloat; legumes also add nitrogen needed by grasses. About 75 percent of the forage is grass species able to produce many leaves but few seed heads or stems.

“The better the forage quality, the higher the livestock intake per acre, and that’s the bottom line,” MacAdam said. On rangelands, rainfall is limited and plants must devote a substantial portion of their energy to produce seeds (and therefore stems) to guarantee their survival. On irrigated pastures, plants can be selected that devote most of their energy to producing leaves.

**The era when
cattle roam over
large tracts of land
isn't over, but it
appears to be
waning.**

Irrigated pastures are a promising option for beef producers, but “there’s a lot we need to learn about the potential for season-long production before we can provide specific recommendations,” MacAdam said.

An example is NewHy, a popular, salt-tolerant cross between quackgrass and bluebunch wheatgrass that was recently released by the Utah Agricultural Experiment Station. NewHy thrives on rangelands receiving more than 16 inches of rain annually and seems to be a good candidate for irrigated pastures.

“NewHy may be one of the most productive new grasses available for irrigated pastures,” said Extension agronomist Ralph Whitesides. “It tolerates salt and intermittent high water tables, is very palatable, and contains about as much protein as alfalfa (about 20 percent).”

And NewHy yields more than most other grasses. In 1993, NewHy yielded 3.58 tons per acre (one cutting), similar to yields of crested wheatgrass but considerably more than orchardgrass (2.89 tons), tall fescue (2.07 tons), smooth brome (1.86 tons) and bluebunch wheatgrass (0.83 tons).

There are plenty of other promising alternatives, including some that haven’t been discovered yet. One promising bunchgrass being studied at the USDA’s Forage and Range Research Laboratory shares many of NewHy’s desirable attributes, but is easier to establish and is more productive under irrigation than NewHy. It probably won’t be released for at least three years.

KG

Jennifer MacAdam 750-2364
Kenneth Olson 750-3788
Ralph Whitesides 750-2259
Randall Wiedmeier 750-2151

**Long sunny days
and cool nights
favor forage
production on
irrigated pastures.**